Evidence Summary for Pediatric Rehabilitation Professionals

Outcome Measures: The Peabody Developmental Motor Scales, 2nd Ed. (PDMS-2)

1. Summary

**Type:** Norm and criterion-Referenced  
**Purpose:** Discrimination, evaluation, planning  
**Population:** Children suspected of having motor difficulties.  
**Age:** 0 – 71 months  
**Time to Complete:** 45 – 60 minutes for entire test; 20-30 minutes per subscale  
**Equipment Needed:** Kit, desk, two chairs, stopwatch, manual, and floor space for motor items

2. Overview

The PDMS-2 (2000) is a revision of the original PDMS (1983). The PDMS-2 has five primary uses:

a. To estimate a child’s motor performance in comparison to peers  
b. To determine discrepancies between gross and fine motor abilities  
c. To assist in goal development  
d. To evaluate progress  
e. To study motor development and ability in children as well as the effectiveness of motor interventions

The improvements made to the PDMS when creating the revised second edition include:

a. Updated normative data  
b. Normative data that is representative of the US population  
c. Stratification by age of normative data  
d. Computed reliability coefficients for subgroups of normative sample  
e. Completion of new validity studies  
f. Availability of more specific performance levels for the scoring criteria  
g. Addition of illustrations to assist with administration  
h. Revisions to administration and scoring format  
i. Elimination of items criticized in previous edition  
j. Revision and reformatting of activity cards into a motor activities program  
k. Evaluation of items using conventional and newer statistical analyses to better identify biased items

The PDMS-2 consists of two scales and six subtests:

a. Gross motor scale  
i. Reflexes  
ii. Stationary  
iii. Locomotion  
iv. Object manipulation  
b. Fine motor scale  
i. Grasping  
ii. Visual motor integration

The PDMS-2 can be administered by occupational therapists, physiotherapists, early intervention specialists, adapted physical education teachers, and psychologists who have a thorough
understanding of test statistics, administration, scoring and interpretation. Administration of 5 of the 6 subtests is started at a pre-determined item, based on the child’s age. A child’s age is corrected for prematurity when the child is under 24 months of age. The “reflexes” subtest is only administered to children under 12 months of age and is always administered from the first item on. For each subtest, a basal and ceiling level must be achieved. Each item can receive a score of “0”, “1”, or “2”, where a score of “2” is indicative of more advanced performance. The basal score is established when a child achieves three consecutive scores of “2”. If the child does not achieve a score of “2” on the first three items administered, the examiner tests backwards until three consecutive items receive a score of “2” and a basal level is achieved. Once the basal level has been established, the examiner administers progressively more difficult items until the child receives a score of “0” on three subsequent items and a ceiling level has been established.

When scoring, all items below the basal level are given a score of “2”. All items beyond the ceiling level receive a score of 0. By adding the scores for each subtest’s items, a raw score is calculated and can be used to determine age equivalents, percentiles, and standard scores. Standard scores for each subtest can then be summed and converted into a gross motor quotient, fine motor quotient and total motor quotient.

4. Measurement Properties

a. Reliability

The PDMS-2 has established reliability. Internal consistency was assessed using Cronbach’s coefficient alpha and results indicate that 90% of the subtests achieved the acceptable reliability criterion of 0.80 and 100% achieved at least 0.70. Reliability coefficients for the special groups assessed (males, females, European Americans, African Americans, Hispanic Americans, children with a speech-language disorder, children with physical disorders) were high (0.93 to 0.99) indicating that the PDMS-2 is equally reliable for children with clinical diagnoses or risk factors as for the general population. One should however consider that the sample sizes for children with disorders are very small (N=41 to 100).

Test-retest reliability was examined by testing 50 children twice at approximately one week intervals. Correlation scores varied depending on the children’s ages and ranged from 0.82 to 0.96 for the different subtests.

Inter-rater reliability was assessed by having two assessors score 60 completed protocols from the normative sample. Results indicate high inter-rater reliability (0.96 to 0.99) for each subtest.

Standard error of measurement and confidence intervals were also examined.

b. Validity

The PDMS-2 has established content, criterion, and construct-related validity. Content validity was examined by different statistical analyses as well as through qualitative analyses.

Criterion related validity was examined by calculating the concurrent
validity of the PDMS-2 with the original PDMS and with the Mullen Scales of Early Learning – AGS Edition (MSEL:A). Correlations were 0.84 for the GMQ and 0.91 for the FMQ of the first and second editions of the PDMS. Correlations with the MSEL:A were 0.86 for the gross motor sections and 0.80 for the fine motor sections.\(^1\)

Examination of the construct-related validity of the PDMS-2 included using confirmatory factor analysis to confirm the structure of the test.\(^1\) In addition, the ability of the PDMS-2 to differentiate between ages was examined and correlations ranging between 0.80 and 0.93 support the construct validity of the PDMS-2 as a measure of motor abilities, which are known to advance with age.\(^1\) Lastly, the validity of the PDMS-2 in different groups of individuals (males, females, European Americans, African Americans, Hispanic Americans, children with mental retardation, children with physical disorders) was also examined. Scores for the gender and ethnicity based groups are within the typical range where as scores for children with mental retardation or physical disorders received lower than typical scores. These findings are consistent with research results regarding motor skills for children in these groups.\(^1\) Caution should however be taken when interpreting these results as the sample size for the “physical handicap” and “mental retardation” groups were very small (N= 41 and N=23, respectively)\(^1\).

5. Further Considerations

Although the authors of the PDMS-2, claim that is has high reliability with the PDMS for children under the age of 12 months, research has shown that scores on each edition of the test do not always correlate as well. For example, when both tests were administered to 30 children between the ages of 11 and 34 months, the scores on the gross motor section of each test differed by 0.5 of a standard deviation 57% of the time and this percentage increased to 77% when scores for the fine motor section were compared.\(^3\) Similarly, results of a study comparing scores of the PDMS and PDMS-2 in 4 year olds suggest that the two versions are not equivalent in this age group.\(^4\) Results of these studies suggest that therapists should identify a single test edition to use within a centre and should not compare scores between tests.

Research has supported the authors of the PDMS-2’s claims that the test has strong reliability. When two occupational therapists administered the test twice to 12 children, test-retest and inter-rater reliability scores for the fine motor scale of the PDMS-2 ranged from 0.84 to 0.99.\(^5\)

Research has also supported the concurrent validity of the PDMS-2 and Bayley Scales of Infant Development, 2\(^{nd}\) Edition,\(^6\) for age equivalent scores but not for standard scores in children 24 months of age. Care should therefore be taken when selecting and interpreting test results.\(^7\)

Other research has called into question the sensitivity of the fine motor scale of the PDMS-2. When two groups of 18 children between the ages of 4 and 5 years, one group with fine motor difficulties and one without, were assessed using the PDMS-2 fine motor scale, the PDMS-2 did not identify difficulties in any of the control group children; however, it only identified difficulties in 39% of the group with known difficulties. This level of discriminative validity is far below the expected criteria of 80%. These results suggest that the PDMS-2 may not be sensitive enough to identify fine motor difficulties in children between the ages of 4 and 5 years.\(^5\)
Further research results regarding the use of the PDMS-2 in specific populations of children, including children with autism, cerebral palsy, and those exposed to substances such as cocaine, are available.

References